THE
VETERINARY JOURNAL

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THE PROGRESS OF SURGERY.

THE progress of Surgery is as noticeable in veterinary science as in that of the human branch of medicine, and we need no excuse for drawing the attention of our readers to the value of a Special Number of the JOURNAL as illustrating this point. Although severely handicapped in many ways, as compared with the advantages which the human surgeon is able to obtain, both by having to consider the pecuniary side of the question and by the insanitary surroundings to which the operator has to return his patient, the Veterinarian is usually able to so arrange and improvise his resources that his ultimate sequel is a "cure." Surgery is always advancing, and the operations which were done even so short a time as twenty years ago are now done as a matter of regular routine by the new graduate, or even by the keen senior student. One has only to visit the clinics of our teaching Colleges to recognise this; and the operations on the organs of the thorax and abdomen which are described and illustrated in our current issue are still further proof of how experimental observations benefit not only man but the sick animals themselves.

SURGICAL SHOCK.

THE question of the prevention and treatment of shock in the domestic animals is not, perhaps, of such importance as in man, although those of us who are frequently performing major operations realise that such a condition has to be contended with.

Mental anxiety, such as is experienced by a human before getting on to the operating table, may not be present in an animal to the same extent, yet one cannot help thinking that some of the very intelligent dogs do imagine that something is going to be done to them when they are being fastened on the table. The cat suffers but little from surgical shock, but horses and cattle sometimes die from this condition following a prolonged operation with much loss of blood, *i.e.*, amputation of the mammæ. The pathology of the condition is not really understood, but it is agreed that the fall in blood pressure is the cardinal factor, and its degree may be regarded as the measure

of the shock. The arteries are greatly contracted, and the veins are dilated, especially in the splanchnic area. It is probable that this venous dilatation is the chief cause of the fall in the blood pressure.

The large nerve cells in the brain have been shown by Crile (*B.M.J.*, 1910, Vol. ii, p. 945) to be structurally altered in an essentially similar manner by shock, cerebral anæmia, sepsis, anæsthesia, and fear. The cells of the cortex and cerebellum are the most susceptible to these changes. The gravity of the shock is in proportion to the number of cells affected. When a limb has been extensively crushed or lacerated there arises a toxic material which rapidly produces shock. Such shock is sometimes prevented by the use of a torniquet and the excision of the crushed muscle, or by amputation before the circulation is restored.

The degree of shock is in proportion to the number of nerves stimulated or injured, thus: parts richly supplied with nerves, *e.g.*, skin, testes, etc., when injured, give rise to the most shock. The length of an operation bears a great relationship to shock, whilst the intensity of the stimuli in such accidents as cause rough injury, tearing or crushing of tissues, causes more shock than clean-cut wounds. Skilful manipulation and the use of sharp instruments cause less intense stimulation to the nerves, and thus less shock.

Of the presence of contributory factors which lower blood pressure, hæmorrhage is the chief. Lowering of the body temperature and exposure of the viscera act in a less direct manner. The lowering of the blood pressure causes a short and quick pulse which is easily compressed: it is often difficult to feel. The respirations are quick, sighing and irregular. Inspiration and expiration are shortened, and the pause between the two is lengthened. The eyes are lustreless, and the eyeballs are sunk in their sockets. The visible membranes are pale and the temperature falls below normal.

In the treatment of surgical shock in the larger animals, as in the smaller ones, it is very important that the patient should be kept warm. A hypodermic injection of strychnine or camphor in oil can be given, and the ammonia bottle held to the nostrils. As severe abdominal operations are not often attempted in the larger animals, it follows that most of the cases of shock that we have to deal with are in the dog, cat, etc. In these cases the first thing is to raise the body temperature. This can be done with hot water bottles, or, better still, by the electric blanket. If there has been severe hæmorrhage an injection of artificial blood serum should be given. This can be easily and quickly made up from tablets containing all the necessary ingredients. Some surgeons make a practice of injecting 0.5 c.c. of pituitary substance immediately the patient comes round from the anæsthetic.

It is a wise precaution to always have a supply of this drug near the operating table ready for immediate use; for to lose an interesting (and perhaps valuable) patient from surgical shock, after the operator has performed a brilliant (and perhaps tedious) operation, is the last word in annoyance and disappointment. Pituitrin is a drug whose properties as a restorative, not only in post-operative cases but in others as well, is as valuable to the veterinary surgeon as it is to his colleague who operates upon the patients of the human species.

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General Articles

BOWEL RESECTION AND LATERAL ANASTOMOSIS IN THE DOG.

By J. G. WRIGHT, F.R.C.V.S.
Royal Veterinary College, London.

Subject.—A six-year-old mongrel terrier, male. Forty-eight hours previous to examination the animal had been involved in a street accident, a wheel of a motor car having passed over the abdomen.

Examination revealed a condition of acute abdominal pain, there being a copious passage of blood from the rectum. A diagnosis of extensive intestinal and peritoneal injury was made, and it was decided to perform laparotomy immediately.

Exposure of the small intestine revealed a portion of the ileum, six inches in length, to be swollen to twice its normal thickness, deeply congested, and with commencing necrosis. The corresponding portion of mesentery had been torn away, and there had been some hæmorrhage.

It was decided to resect the affected portion of the small intestine, and to effect union by lateral anastomosis. Recovery was uneventful.

Operation.—The animal was placed in the dorsal position, and anæsthesia produced by the inhalation of chloroform (Duncan, Flockhart) by means of a Hobday inhaler. In view of the animal's precarious condition preliminary morphine narcosis was not used. The hair of the abdomen was removed by means of barium sulphide paste (a watery paste of a 25 per cent. barium sulphide powder smeared over the hair and left for five minutes).

The prepuce was drawn well to the side of the middle line and fixed by a suture. The skin was disinfected with ether and tincture of iodine, and the whole of the abdomen and chest covered by sterile cloths held in position by towel clips.

Part 1.—Removal of the affected portion of bowel. The abdominal cavity was opened by an incision three inches long, and terminating about one inch in front of the penis. Having searched for the affected portion of bowel, it was carefully drawn well out of the abdominal wound and placed on hot wool pads. A pair of bowel clamps was next placed across healthy bowel in front and behind the injured portion. By means of the fingers the intestine adjacent

to the clamps was squeezed until the lumen was empty, and a second clamp applied about one inch away from the previous one. It was between the clamps at either end that section was made, having first ligatured the anastomosing mesenteric arteries close to the line of section. The cut ends were then cleansed with swabs.

Part. 2.—Closure of the cut ends. The cut ends of the intestine were closed, first by a continuous suture of No. 1 silk. This was tucked in and sealed by four Lembert interrupted sutures of the same material.

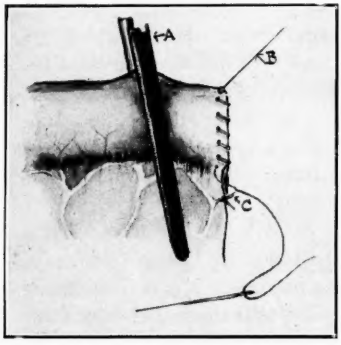

FIG. 1.—Closure of cut end of intestine. A—Bowel clamp; B—Continuous suture through all coats; C—Ligature on anastomosing branch of mesenteric artery.

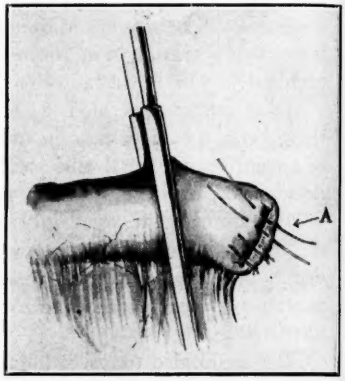

FIG. 2.—A—Sealing by interrupted Lembert sutures.

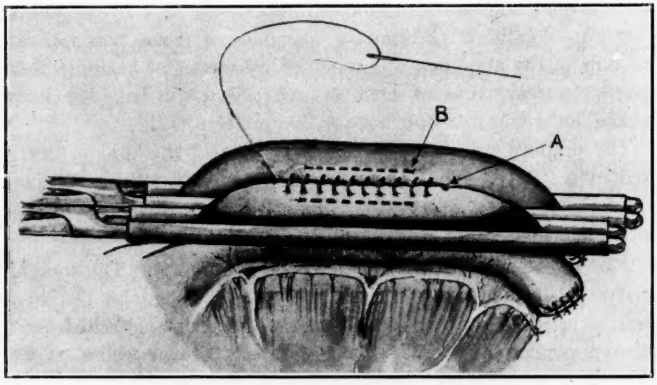

FIG. 3.—Lateral Anastomosis: two segments of gut approximated. A—Continuous suture through sero-muscular coats; B—Dotted line indicating bowel incisions.

The small diameter and the turgidity of the muscular of the dog's small intestine tends to make this part of the operation difficult.

Part 3.—Lateral anastomosis. The ends of the divided intestine were held by bowel forceps, and approximated in the manner shown in Fig. 3. A continuous suture of No. 1 silk through the sero-muscular coats for a length of one and a-half inches served to join the opposed portions of bowel (Fig. 3a). Next, an incision, one inch in length, into the lumen of the intestine, was made on the convexity of each loop (Fig. 3b), and the interior sponged out.

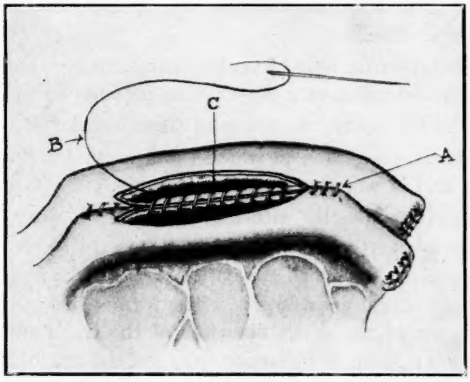

FIG. 4.—Lateral Anastomosis (bowel forceps are omitted for clearness). A—Continuous sero-muscular suture uniting segments; B—Continuous suture through all coats establishing anastomosis; C—Bowel lumen.

The margins of the incised bowel were next sewn together by continuous sutures (Fig. 4b) passing through all coats. Having sponged the parts, the whole is sealed by another sero-muscular continuous suture one and a-half inches in length (Fig. 5c).

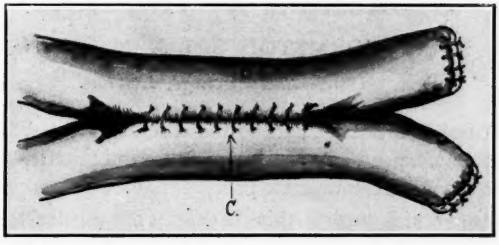

FIG. 5.—Lateral Anastomosis completed. C—Continuous sero-muscular suture sealing anastomosis.

The part was then covered by omentum held in position by a few sutures, and the whole returned to the abdominal cavity. The abdominal wound was closed in the usual way.

Discussion.—The indications of bowel resection in the dog are numerous, and the following conditions occur to one as being frequently encountered.

Necrosis of the intestine occurs frequently as the result of obstruction by a foreign body of some days' duration. In the early stages of such a condition, *viz.*, within the first forty-eight hours, enthotomy suffices, but later, when necrosis has set in, resection of the affected portion is imperative.

Strangulated hernia, either a ventral hernia the result of an accident, or the sudden extension of a pre-existing inguinal hernia.

Injuries to the bowel, the result of street accidents.

Cases of intussusception in which the invaginated portion cannot be reduced, and in which necrosis is occurring.

Stricture of the intestine, either as the result of injury to the bowel wall, or associated with a malignant growth.

The question arises which type of closure is to be adopted: either end-to-end, or lateral anastomosis. The former has grave disadvantages. In view of the small diameter of the dog's small intestine, effective union is difficult to accomplish, and the risk of a consequent stricture is great.

I would finally like to make due acknowledgment to Professor McCunn, Mr. G. B. Brooke and Mr. C. Formston, who introduced the technique of this operation to the Royal Veterinary College, and to Mr. C. Machin for his help during and subsequent to the operation.

A SURGICAL TREATMENT FOR CHRONIC OTORRHŒA IN THE DOG.

By C. FORMSTON and J. McCUNN

Royal Veterinary College, London.

MANY cases of otorrhœa pass to the chronic stage. They become a source of annoyance to the patient, owner, and practitioner. Their response to the usual treatment is poor, if at all.

The causes which lead to this chronicity are all due to a solution of the continuity of the integument. This integument lines the conchal and annular cartilage of the external ear. This rupture of the

protective covering leads to erosion, followed by ulceration, which may be acute or chronic.

The predisposing causes of this erosion or ulceration are two: (1) All otorrhœas are of necessity septic; (2) the tubal part of the conchal and annular cartilages are seemingly long. Further, this tube is not straight. This want of straightness can be easily appreciated by any observer who attempts to examine the membrane tympani of the dog. It is questionable if a full view of the membrana tympani is ever obtained in an examination.

FIG. 1.—Normal ear with probe in position, indicating direction of external auditory canal, also direction of primary incision.

This peculiarity of the tube renders drainage very difficult. This again can be appreciated if, with the help of a syringe, one fills this tube. It is difficult to empty it again completely. This difficulty of drainage leads to a retention of irritant septic matter, and erosion is easy. There are two points at which this erosion most readily occurs: (1) around the membrana tympani; (2) more frequently at the line of the highest level of the retained fluid. The erosion may or may not be progressive. In any case it is painful, causing irritation and suffering.

The mechanical damage produced by the dog itself now comes into action, and further widens the area affected, both in depth and area. The erosion may extend to the cartilage, and if such is the case, irreparable damage may occur.

The lining integument of the ear seems to respond readily to irritation, and since the ear is readily supplied with blood, granulation tissue is rapidly proliferated. This granulation tissue may soon attain large dimensions.

The epithelial covering of the integument also proliferates, and in many cases the granulation tissue has a covering of stratified epithelium, *i.e.*, skin, forming what is known as an aural papilloma. In chronic ulceration the adjacent surfaces may be involved, leading

to a fibrous union or narrowing of the passage by cicatrisation. Both the foregoing incidents lead to blockage of the aural tube, burying diseased conditions between the lesions and the membrana tympani. There may be complete closure. In these circumstances it is impossible to treat an ear by the usual methods. Surgical interference is, in our opinion, necessary. The object of this interference is to remove the obstruction and to allow of free access to the deeper

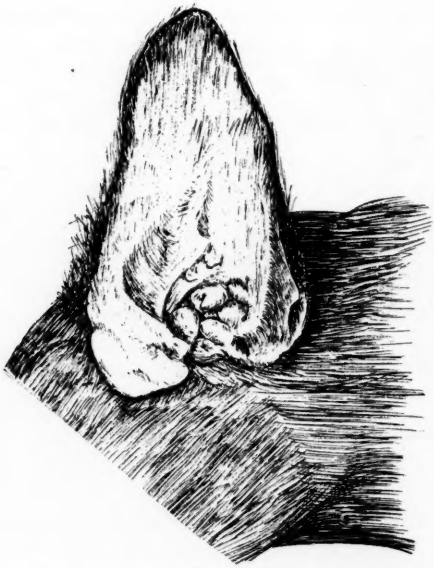

FIG. 2.—Ear showing aural papillomata

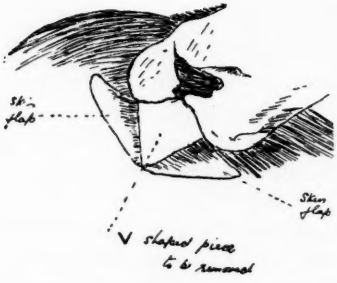

FIG. 3.—Showing the flap dissected back.

FIG 3A.—Triangular piece of cartilage after removal.

areas. We have found that free excision of a V-shaped piece of cartilage, the apex of the " V " being well below the site of obstruction, facilitates treatment and subsequent resolution.

Surgical Technique.

The animal must be well restrained. This is best brought about by administration of morphia and chloroform. The site of operation is shaved and painted with tinct. iod. mitis. The inside of the external ear, as far as possible, is cleansed with ether. A blunt probe is introduced into the external auditory canal to ascertain its direction, and to act as a guide for the initial incision.

After making the first incision the skin on either side is dissected from the underlying tissues, and is reflected back as a flap. This exposes cartilage and some muscle fibres of the paratido auriculoris. The V-shaped portion is then removed. The flaps of skin are then brought back and sutured to the remaining tissues on either side.

This V-shaped piece of cartilage which is removed usually constitutes the major portion of that which is ulcerated, or may show two or more adjacent ulcerating surfaces. If it is a case of aural growths, then the integument of this resected piece contributes largely to the papillomatous mass. After resection any ulcerated surfaces left are separate, and since friction is dispensed with there is every chance of healing. Again, any papillomatous growths that remain, even if they continue to grow, are not sufficiently low to occlude the external auditory canal. Of this canal, three-quarters of an inch is still left, and the membrana tympani is not directly exposed to external influence. Since it is impossible to perform this operation aseptically, it is advisable to smear the wound edges with a little B.I.P.

The ear flap is laid on the head in the direction of the opposite ear, and after applying a gauze pad, is bandaged. The ear needs no inspection for two days. At the end of this time any discharge is wiped away, a little B.I.P. is applied, and after re-bandaging, is left for a further two days. No antiseptic lotions are used.

Although healing by primary union does not take place, there is never any marked degree of suppuration. The dog experiences relief immediately the operation has been performed. Healing takes place in from twelve to twenty days. Up to date, six cases have been submitted to the operative measures advocated, with favourable results in each case.

We are indebted to Mr. Saunders, Class B, R.V.C., for his help over the drawings.

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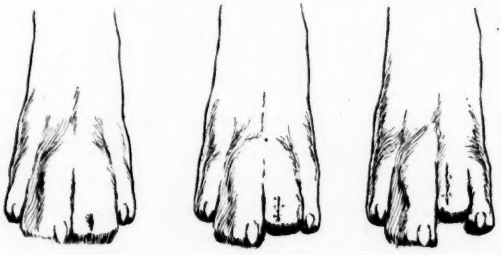
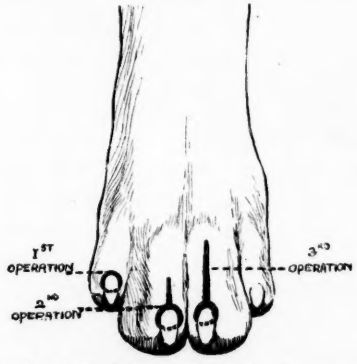
SOME SURGICAL CONDITIONS OF THE DIGITS IN GREYHOUNDS.

By C. WENTWORTH ELAM, M.R.C.V.S., D.V.H.
Liverpool University.

To those practitioners who officiate at Greyhound Racing Tracks in Great Britain my remarks will probably be of little interest ; yet there are many members of the profession who are unaware of the various surgical conditions of the limbs which are commonly met with in greyhounds.



Result of 1st operation. Result of 2nd operation. Result of 3rd operation.



Showing lines of incisions made in the three operations.

Lameness due to racing is one of the commonest causes of unfitness in " track " greyhounds ; particularly is this the case at those tracks where the bends are unusually sharp. I do not intend to discuss the many conditions which are responsible for causing lameness, but to confine my remarks to those conditions which call for surgical treatment in connection with the digits alone.

The foot of the greyhound is a delicate complicated structure, and it is only natural that such a structure is liable to suffer from the effects of continuous racing on a circular or oval track, the surface of which varies according to the weather.

Lameness due to injuries to the " dew " claws occasionally occurs, and in such cases it is advisable in the majority of cases to remove the dew claws rather than take the risk of the lameness recurring from a similar cause, and the animal being rendered periodically unfit for racing.

Injuries to the remaining four digits are common and often troublesome, particularly in those cases where one is undecided as to the advisability of adopting surgical means to remedy the condition. The common condition of " knocked-up toe " usually responds to continuous treatment with cold water and refrigerating lotions; but should their be any suspicion of partial dislocation or fracture it is essential that a Röntgen ray shadow be made use of to reveal more or less accurately the position of the ends of the fractured bone before deciding what surgical treatment should be adopted.

If the greyhound is a valuable one, and the question of expense and time are of secondary importance, certain fractures of the digits may be " wired," no deformity thus resulting. In many cases, however, the owner is desirous of having the animal fit for racing as soon as possible, irrespective of any deformity which may result from surgical interference.

In the case of partial luxations or fractures in such animals, it is advisable to remove the lower luxated or fractured digit. The question which arises is: How far can you interfere surgically with the foot of a greyhound so as not to cause any after ill-effects in the speed and action of the greyhound?

First Operation.—The small third phalanx and claw can be removed without causing any inconvenience to the greyhound. *It should be borne in mind that since the pads of the feet serve a specific purpose they should be preserved in all operations on the digits. Moreover, removal of skin or tissue other than bone should be avoided in all cases.* The patient should be laid on its side and fastened on the operating table in this position, so as to minimise the risk of muscular injuries which may arise from struggling.

The operation area is prepared in the usual manner, and the part anæsthetised completely by means of a local anæsthetic injected deeply into the area. In order to shorten the period of unfitness, no incision is made into the skin, but the knife carried around the base of the claw and around the third phalanx to the necessary depth.

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The claw is now pressed in the downward direction, the dorsal ligament severed, and the third phalanx and claw removed with ease.

The removal of the phalanx by this method leaves the pad untouched and in its normal position, while the small opening left merely requires two or three sutures to close it. After the operation the foot is dressed with an antiseptic and bandaged, and the paw protected by means of a baby's sock.

Second Operation.—The removal of the second and third phalanx and claw rarely causes any after trouble to the patient. In this case the third phalanx and claw are removed as in the first operation previously described, and an incision is carried upwards in the middle line from the base of the claw to the upper limit of the second phalanx. Through this latter incision the second phalanx is removed, and the opening sutured. The parts are then dressed in the usual manner, bandaged, and a sock applied.

With ordinary care in both the first and second operations the patient will be fit for racing in three to four and a-half weeks.

I recall one case in which a greyhound suddenly showed signs of acute lameness when racing, and on examination the second phalanx of the third digit was found to have been fractured. The fractured phalanx was removed in seven pieces in the manner described above, and the animal was racing five weeks later, and has raced for over a year without showing any signs of lameness or interference with speed.

Third Operation.—The removal of the first phalanx, though often successful, appears at times to interfere with the whole foundation of the foot, for in a few cases where the first phalanx of the third or fourth digits have been removed, the patient has gone acutely lame owing to loss of support to the adjacent joints. Such greyhounds should not be raced over 300 yards. When operating, the first phalanx is removed together with the second and third phalanges and claw, as in the two previous operations, but in this case the incision is carried from the base of the claw to the upper limit of the first phalanx.

If the operations are carried out in the manner described and the pads preserved, it will be seen from the illustrations that there is little deformity as a result of the first and second operations, while though the deformity is more marked after the third operation, there is still left a kind of " bolster " or " buffer " to act as a pad to support the adjacent digits on either side when excessive strain is placed on them when the animal turns sharply.

Chronic Arthritis of the Joints of the Digits.

There are times when several joints of the digits of one or more feet are affected with chronic arthritis, and to attempt the removal of all the affected phalanges would be out of the question. In such cases as these it will be found that simple "blistering," or firing and blistering, of the affected joints often removes the lameness and renders the patient fit for racing again.

I wish to express my thanks to the Director of Veterinary Studies (Professor Share Jones) for valuable suggestions.

THE TYPICAL FRACTURE OF THE OLECRANON IN THE DOG.

By A. C. SHUTTLEWORTH, B.V.Sc., M.R.C.V.S.

Department of Veterinary Anatomy, University of Liverpool.

FRACTURE of the ulna without involvement of the radius is rare in the dog, but, nevertheless, a typical fracture of the ulna occurs when the head alone is fractured. The olecranon process of the ulna is well protected from damage when in its normal position. Flat against the wall of the chest, and behind the humerus, with its heavy coating of muscle, it is from the outside and rear only that injury can arrive. Even from these points the violence must be concentrated to impinge directly upon the bone, or much of the force will be absorbed by the humerus, or by the resilient chest wall.

When the limb is extended and leaves the shelter of the trunk, it is open to violence from many directions. It is now that the subcutaneous position of the olecranon shows its vulnerability. The extended position of the fore-legs is that commonly assumed by a dog when involved in a motor accident, and a blow upon the point of the elbow by a projection of the chassis will result in the typical

fracture. Specimens of this fracture have occurred time and again at the Liverpool University Veterinary Hospital, and on one occasion a fracture of this class occurred in both olecranons. In this case the dog assumed the "begging" posture seen in fracture or injury of both the fore-legs.

The fracture is illustrated, and shows the breakage to extend from the upper part of the articular surface just beneath the beak of the ulna, downwards, outwards, and backwards. At the time of injury the muscles are in a condition of extreme tonus, and the anconeus muscle swings the lower extremity of the upper fragment outward. The heavy flexor carpi ulnaris assists this movement by pulling the tip of the olecranon downwards. The triceps then pulls the displaced fragment forward, and locks it in the olecranon fossa. This fracture is difficult to reduce, impossible to retain in the normal position without screwing or wiring, and it invariably results in ankylosis of the elbow.

As the bone is subcutaneous, this fracture is almost invariably a compound one. If the bone is not showing through the skin great care must be taken, or the razor-like edge of the fragment will very soon cut its way to the surface.

TWO CASES OF TREATMENT OF FRACTURES BY WIRING.

By J. McCUNN and C. FORMSTON

Royal Veterinary College, London.

Case I.—Fracture of the Upper Jaw of a Horse.

The subject was a roan cart gelding. It was sent to the College by Mr. Rix, of Bexley Heath, with the following history: It was discovered at morning stables with an injury to the jaw, which, when he had examined it, proved to be a fracture of the premaxillary bones. The fracture was in the line of the symephysis, and there was considerable displacement. The right half was turned back, and the incisor teeth of this portion were impinging on the hard palate.

It was resolved to attempt treatment. The animal was cast. It was decided to use a local anæsthetic, and "Waites" was the solution used. Nerve blocking was performed by infiltrating the fifth nerve at its point of exit from the infra-orbital foramen. As an extra precaution, the gums and mucous membrane of the premaxilla were injected locally. Anæsthesia was complete.

The first step in operative procedure was to attempt reduction of the fracture. This was found to be impossible under digital mani-

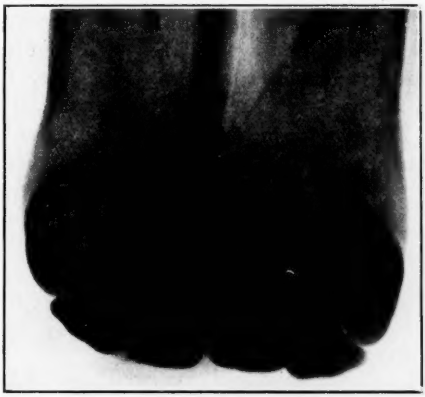

FIG. 1.—X-Ray of colt's jaw showing wire in position.

pulation. Recourse was made to the large molar extraction forceps (horse), and by their aid some degree of rectification was made. The damaged portion was then further reduced by the aid of a hammer. It was decided to strengthen the jaw by a wiring operation. A crescentic flap of mucous membrane was dissected from the labial surface of the jaw. The maxillæ were then bound from above downwards, penetrating the bone near the junction of the nasal process and the body. A stout wire was then passed through to the palatine aspect. The mucous membrane of the hard palate was incised over the wire point, and the wire was drawn through.

FIG. 2.—The fractured os calcis before operation.

The wire was then passed under the hard palate to the other side of the jaw. It was directed under the mucous membrane. It was not neces-

sary to incise this membrane; the wire was gently pushed through the connective tissue uniting mucous membrane and bone. The end of the wire was then directed through the hole already drilled in the opposite side of the jaw. Tension was applied, and the wire was secured by twining one end around its fellow in the mid-dorsal line. Superfluous wire was clipped away, the ends being gently tapped flat and buried by suture of the crescentic flap previously made. The fracture was firmly fixed. The line of the incision tables was nearly perfect. Subsequent treatment consisted of liquid food for three days, after which the animal was put on ordinary diet. The wounds healed rapidly by first intention, and the subsequent history has been one of unqualified success.

FIG. 3.—After operation. X-Ray by Mr. H. J. Ede.

CASE II.—FRACTURE OF THE OS CALCIS.

The subject was a greyhound which, in one of the big open races of June 1930, had met with an accident. The hock was fractured through the body of the os calcis. The case was in the hands of Mr. G. N. Bushman, and owing to the potential value of the animal it was resolved to attempt treatment. From an examination of the X-ray photographs, an operation by wiring or plating was decided upon. The os calcis was drilled, and a nickel peg inserted in its long axis. This fixation was further strengthened by wiring, as shown in the accompanying photographs. The hock was fixed in a removable splint designed to facilitate dressing and made of poroplastic felt.

There was considerable swelling after the operation, and one of the wounds became slightly septic. This resolved under local treatment. Massage treatment was applied, beginning one week after operation, and the subsequent history was recovery, good if somewhat slow. Our latest news to hand is that the dog is now galloping well, and the owner hopes to race him during the coming season.

TWO CASES OF PERSISTENT SINUS.

By J. McCUNN and C. FORMSTON
Royal Veterinary College, London.

Case 1.—The subject was a three-year-old cocker spaniel bitch. For eight months there had been a sinus discharging muco-pus in the region of the left costal arch. The site of the opening was in the left hypochondrium. A deep-seated foreign body was suspected, probably one that had been ingested and had gained its present position by penetration from the stomach. It was decided to X-ray the patient. This revealed a faint shadow in the tissues deep to the sinus. The shadow lay at right angles to the long axis of the ribs. It was decided to operate. A local, together with a light general anæsthetic was used. A director was inserted, and the sinus tracked to its origin. Much to our surprise, as we deepened our incision, the track was found to lead to an intercostal space. The external intercostal muscle was exposed, and a small hole was discovered. A probe passed through this hole quite readily, but no trace of the foreign body was discovered. It was decided to follow the sinus further.

The intercostals were incised, and the pleura exposed. It was seen that we were now on the thoracic side of the costal arch. The pleura was incised, and the chest entered. The lung could be quite plainly seen. Probing failed to elicit the presence of a foreign body. Digital manipulation was resorted to, and after some considerable search a sharp metallic foreign body was located adherent to the anterior face of the diaphragm. Forceps were inserted, the object seized, and with difficulty withdrawn. The foreign body proved to be a sewing needle. The thorax was closed and the wound closed in layers. All necrotic tissue surrounding the sinus was removed as far as possible. Recovery was complete, although not without anxiety. The remarkable points as regard this operation were: (1) The site of the foreign body. It was never suspected that it was in the thoracic cavity. (2) The faint shadow cast by the object when exposed to X-rays. This was probably explained by its attachment to the diaphragm and consequent movement. (3) The ease by which the chest can be entered, and the little, if any, effect this opening of the thoracic wall had upon the respiratory or circulatory systems.

Case 2.—Subject a bay cart gelding. History: The animal had been involved in an accident about eight weeks previously. As a result of the accident a shaft was broken. The animal was admitted to hospital suffering from a persistent discharge from a sinus in the left saddle area. This sinus had been in evidence for two weeks. On examination by probe this sinus was found to have a depth of

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5½ in., passing downwards and forwards towards the withers. At the bottom of the sinus a hard object was encountered. It was resolved to operate. As a result, two pieces of wood were found, 2½ in. by ½ in., and 1 in. by 3⅛ in. These were removed by the aid of bullet forceps. Recovery was uneventful. The owner's surprise was great, for the injuries incurred in the accident were apparently purely superficial, and the animal had been at work for some time before a small abscess was located in the region of this sinus.

POST-OPERATIVE TREATMENT.

By DAVID ERIC WILKINSON, M.R.C.V.S.
Chigwell.

THE success or failure of many veterinary operations is largely determined by the post-operative attention given to the patient, and it is no exaggeration to state that unless this is such as will prevent infection, delayed healing and unnecessary scars, much of the surgeon's labour is wasted, and his technical skill discounted.

In a well-equipped and well-managed hospital the after-care of surgical cases is naturally of the very best, but even there the personal supervision of the surgeon is essential if the best results are to be obtained. It is too much to expect of even the best groom, kennelman, or maid, that they should recognise the subtle changes in the progress of healing that call for a prompt change of dressing or treatment, even if their training and experience have been sufficient to enable them to carry out ordinary routine dressings.

To rely upon the services of these half-trained assistants is to minimise the value of professional training in the eyes of the layman, and cannot be too strongly condemned by those who have the welfare of the profession at heart.

Possibly the most important object in the surgeon's scheme is healing by primary union. To the attainment of this many factors necessarily contribute. Against it equally many factors militate. Amongst the latter, probably the most common is the abuse of antiseptics.

Assuming that the site of operation has been rendered surgically clean prior to the primary incision, that all instruments and dressings have been sterilised, and that the surgeon has paid due regard to personal cleanliness prior to and during the operation, there are very many cases, more especially amongst the smaller animals, in which asepsis may be successfully practised, and the use of antiseptics avoided.

By the use of aseptic methods and dressings, the natural process

of healing is encouraged by the call of the tissues themselves upon the humoral secretions. These secretions are often retarded by the dressings applied.

There are undoubtedly " fashions " in drugs as in other commodities, and one meets one day with the surgeon whose ideal is a " dry " dressing, and next day the man who pins his faith to solutions. Again, one encounters the man who bandages all his wounds, and his fellow who loudly proclaims the benefits accruing from free exposure to air. Realising the extreme difficulty of obtaining a sterile atmosphere, even under experimental conditions, it is difficult to reconcile the contention that exposure to the dust-laden atmosphere of even a decently clean kennel or stable is beneficial to wounds with one's preconceived ideas of the importance of asepsis or antisepsis.

One also hears the statement that dogs will not lick exposed wounds which have been dressed with a potent antiseptic. Whilst freely admitting that a sterile wound is generally a painless wound, the writer has yet to meet with any dressing of any description which a dog will not lick off.

More fantastic still is the theory occasionally encountered that the saliva of our patients is a natural antiseptic. One need only make a very simple culture in an incubator from a swab taken from an apparently " clean " mouth to reap an abundant flora from the bacillar inhabitants of this so-called " natural antiseptic."

Amongst other conditions which call for the careful observation of the surgeon is the ability of healing surfaces to supply a sufficiency of serous secretions to promote the growth of new tissues. Should this humoral secretion be deficient, every effort must be made to stimulate it, or a dry, cracked surface with a tendency for sutured edges to curl up and separate, resulting in delayed healing or unsightly scars, will follow. For this purpose moist sterile swabs may be applied to the wounds, or some such agents as will rapidly promote a flow of serum, the best of these being probably glycerine or castor sugar.

In the after treatment of plastic operations upon the skin, such as " Cherry's " operation for the removal of the scars of " broken-knees," which the writer performed many times in the pre-War days of abundant equine practice, this " seragogue " treatment, to coin a word, was extremely important.

By this means, accompanied by careful bandaging, close approximation of the edges of the wound with early union was assured, and early removal of sutures with its resultant avoidance of scarring, possible. Another complication to be guarded against, in equine practice especially, is œdema of the extremities. In many instances

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it may be necessary to keep a horse tied up and standing for several days after operation, and unless precautions are taken, in the form of massage to the limbs and supporting bandages, gravitation swelling with consequent gaping of the edges of wounds is bound to result.

Thorough disinfection of the body and limbs is not so easy to obtain in the horse as in the smaller animals, and his greater susceptibility to the infection of tetanus must be borne in mind. Fortunately, it is possible by means of anti-tetanic serum, adequately and cheaply to protect our equine patients against this infection, and in all major operations upon the horse, and in badly infected districts, this precaution should not be neglected. A friend of the writer's, who practised formerly in Calcutta, states that prior to the discovery of anti-tetanic serum one feared to perform even the most trifling operation upon a horse in that city for fear of tetanus.

With many operations upon the equine subject adequate protection against infection is impracticable, and the writer well remembers one colt upon which he performed the " covered operation " of castration, with every possible antiseptic precaution, including the use of two separate loose-boxes—one for night, the other for day —each being sprayed out with hot disinfectant solution and supplied with fresh clean bedding daily, becoming seriously ill before his clams could be removed. This case responded promptly to injections of a polyvalent anti-streptococcic serum, so that infection of his operation wounds appeared to be the cause of his illness.

When asepsis is impossible or impracticable, antisepsis must, of course, be practised, and here again the surgeon's careful supervision of the suitability, potency, and strength of the antiseptic is necessary. Since the War the hypochlorite solutions, eusol, Dakin's solution, and others of a similar nature, have become deservedly popular. These, it may be recalled, are modifications of the old Labarraques' solution, named after a Parisian chemist of the eighteenth century. If freshly prepared they are non-irritant and non-toxic, and as they are oxidising agents, are especially useful for the irrigation of deep wounds. Here again the use of a " seragogue " may be called for, as in abscess cavities which after being evacuated show a tendency to gape with dry edges. Irrigation with a hot hypertonic salt solution or packing with dry muslin bags filled with dry sodium chloride may be effective, but the application of dry castor sugar is less irritant and painful, and is followed in a few moments by the exudation of beads of serum from even the driest of wounds. If it is desired to use an antiseptic in addition, a solution of Acriflavin, 1 in 1,000, is advisable as its activity is increased in the presence of serum.

When daily personal dressing of bandaged wounds is impossible, the bandages applied should be of some permeable material, such as cheese cloth, and an antiseptic lotion such as eusol provided for the attendant to soak the dressings with. This precaution will guard against infection by careless attendants who neglect the minor proprieties by the use of sponges, dirty utensils, and half-cleaned hands. In selecting an antiseptic for irrigation into cavities such as the vagina, urethra and bladder, one should not forget the value of the permanganates. A surgeon friend of the writer's who specialises in this class of work says he knows of no irrigation to equal that of 1 in 6,000 permanganate of potash, injected at a little above body heat, and has returned to the use of that almost exclusively after making an extended trial of all the more "fashionable" drugs. Here again it is probably the liberation of oxygen in cavities not freely exposed to air, and the consequent destruction of anaerobes, which accounts for much of the benefit obtained.

In canine and feline practice the susceptibility of the patients to poisoning from cresylic and carbolic acid preparations must be borne in mind. Iodoform, not now so freely used as formerly, is poisonous to these animals, whilst the writer has seen grave illness in the dog following the use of cyanide gauze. Bandaging of almost any part of the body and limbs is practicable if one is determined and persevering, and the writer some years ago obtained healing of an immense wound caused by the ablation of a fibroma weighing 19 lb. from a horse's elbow, in six weeks time, by persistent bandaging.

A difficulty to contend with in these huge wounds is the profuse purulent discharge arising from the breakdown of enormous numbers of leucocytes attracted to the wound.

According to the German biochemist, Schlussler, this breakdown is due to a potassium chloride deficiency. Certainly the results obtained by the writer from the use of this salt in solution in treating wounds exhibiting a profuse purulent discharge seems to confirm this view.

OOPHORECTOMY IN THE MARE: DOUBLE FLANK OPERATION.

By J. G. WRIGHT, F.R.C.V.S., and R. MACHIN, M.R.C.V.S.
Royal Veterinary College, London.

Subject.—Eight-year-old chestnut pony mare. History, that the animal was unsafe for work during periods of œstrum. It was decided to perform öophorectomy, and in view of the animal being a small one, to perform a double flank operation.

Preparation of the Patient.—The mare was fasted for thirty-six hours prior to operation, a muzzle being applied to prevent eating the bedding. On the afternoon previous to the operation being performed each flank was clipped and the operation area denuded of hair (the near side was shaved and the off was treated with a 25 per cent. barium sulphide paste). These were thoroughly cleansed with soap and a 2 per cent. lysol solution, followed by surgical spirit.

Method of Casting.—The animal was thrown on to the off side on a straw bed, using light "Farmer Miles" rope hobbles, and anæsthesia effected by chloroform (Duncan and Flockhart), Messrs.

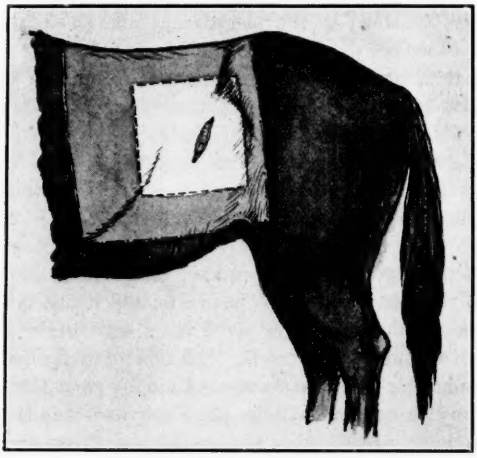


FIG. 1.—The site of incision.

Shahi and Wazir (students) acting as anæsthetists. A Cox's inhaler was used, and plenty of air allowed. Three drachms were used as a first application, a further drachm being added after six minutes. General anæsthesia was effected in eight minutes. Subsequent doses of chloroform were added; to these we shall refer later. The uppermost hind limb was then released from the hobbles and drawn backwards, and so exposing the site for incision without any wrinkling of the skin. The area was next sterilised with ether (meth.), and tinct. iodi. mitis.

Towels, sterilised by boiling and held in position by towel clips, were applied, leaving exposed an area 5 in. square through which to operate. The site of incision will be seen from Fig. 1.

An incision, four inches long, was made, its direction being downwards and slightly forwards, through the skin and the aponeurosis

of the external oblique muscle, and exposing the fibres of the powerful internal oblique. These were quickly divided in the direction of their fibres (nearly at right angles to the skin incision) by blunt dissection with the fingers. The transverse abdominal muscle was next encountered and treated in the same way. Division of these muscles by the fingers is comparatively easy, and hæmorrhage is negligible. The peritoneum was now exposed, and care was taken not to separate it from the overlying transversalis.

By this time we had penetrated a depth of three inches, and to overcome any risk of injury to the structures in the abdominal cavity, the peritoneum was seized with long fixation forceps, and drawn out of the wound before incision was made.

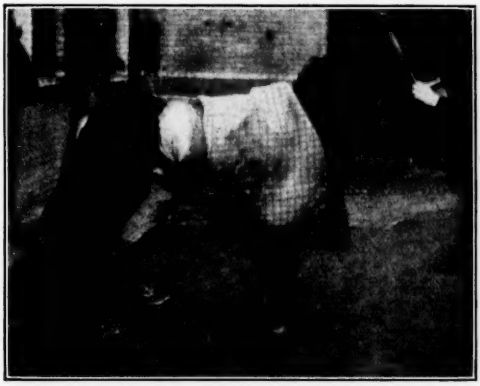


FIG. 2.—The subject eight days after operation.

The hand was inserted into the abdominal cavity, where the left ovary could be felt and recognised easily, lying beneath and slightly spinal to the upper end of the incision. It was grasped and drawn out of the wound.

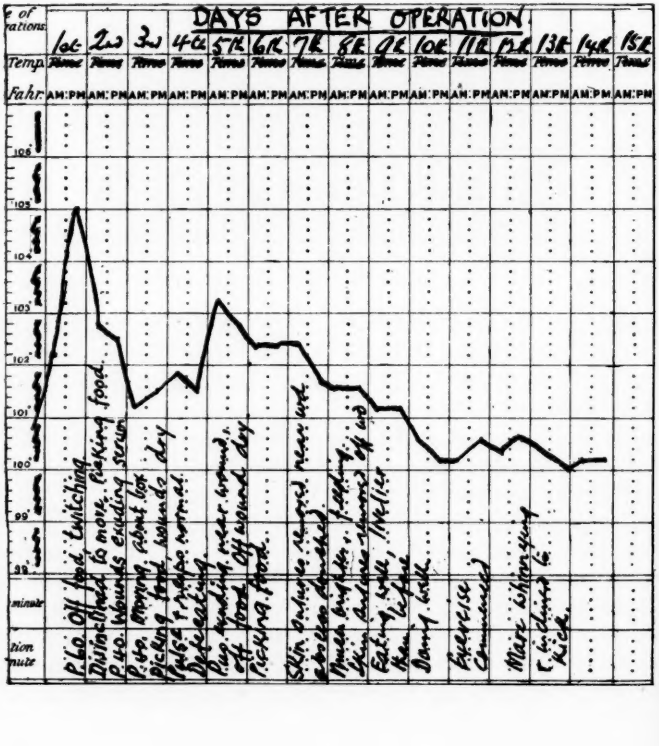
The broad ligament in the mare is short, and only just allows the withdrawal of the ovary out of the abdominal cavity. It was removed with an emasculator.

The peritoneal wound, with the transversalis, was closed by two interrupted sutures. Three were placed in the internal oblique muscle, and finally four in the skin (No. 6 silk and a Finnemore needle was used throughout). The wound was now covered with three thicknesses of sterile calico, held in position by clips to prevent contamination when the mare was turned over. The near hind limb, of course, was again included in the hobbles previous to turning.

The off side site was then prepared in the same way, and whilst this was being carried out, all instruments, towels, etc., were again sterilised by boiling.

The off hind limb was now drawn back and the right ovary removed in the same way. The only difference in technique being adopted was that this time the hand was not introduced into the abdomen, as it was possible to grasp the ovary with two fingers.

The time taken in performing the operation was 42 minutes: 15 minutes for the first operation; 15 minutes were spent in turning the animal and preparing the off side; and, finally, 12 minutes for the second operation. Fifteen drachms of choloroform were used: four drachms provoked anæsthesia, and further doses of one drachm were added to the sponge every three or four minutes. The animal rose 20 minutes after completion of the operation. The sites were covered with a clean towel wrapped around the abdomen, and the animal was then rugged.



After-Treatment.—Twenty-four hours after operation the temperature rose to 105° F. This we attribute to peritoneal reaction, for it was down to 102.8° the following morning. Following this, for two days the temperature remained about normal, during which time the animal, although disinclined to move, was feeding. This was followed by three days of a temperature fluctuating around 103°, during which time the appetite was variable. This was found to be due to some deep suture suppuration between the layers of the internal oblique of the near side wound. Liberation of the pus was quickly followed by a lowering of temperature and an improvement in appetite. The abscess cavity was douched with a 1 per cent. lysol solution, and four of the deep sutures were removed. Up to this time, seven days after operation, the off wound had been healing by first intention, when a little stitch suppuration was noticed, and so the skin sutures were removed. From this point the mare went ahead by leaps and bounds. At the time of writing, three weeks after operation, she is perfectly fit. The near side wound has entirely healed. There is some slight suppuration from the lower end of the off wound from a buried suture, which at the moment we are unable to locate.

The accompanying chart, with remarks, will serve to illustrate the mare's daily progress.

DISLOCATION OF THE HIP AND FRACTURE OF THE NECK OF THE FEMUR IN THE DOG.

By A. C. SHUTTLEWORTH, B.V.Sc., M.R.C.V.S.

Department of Veterinary Anatomy, the University of Liverpool.

CLINICALLY, these two conditions show great similarity, and very often X-ray has to be used as a diagnostic medium. Both follow a similar series of events. A motor accident is the usual source of the trouble, one of the car wheels passing over the groin of the dog. Occasionally the animal may be spread-eagled upon the ground, and the wheel passes over the region of the hip.

In the case of dislocation, the violent abduction of the limb continues until the pectineus muscle ruptures, the upper part of the neck of the femur engages with the upper edge of the acetabulum. The violence continuing, a great tension is placed upon the round ligament, whose fibres part, and the head of the femur leaves the acetabulum with a twist that deposits it above or, rarely, below the socket.

In fracture of the neck of the femur, the pressure of the rim of the acetabulum and the pull of the strong round ligament proves too

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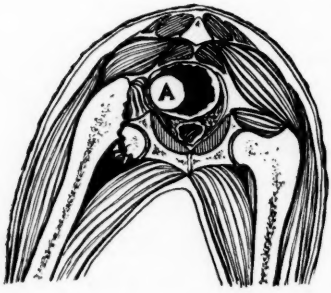
much for the bone, and fracture occurs just below the articular head. The position adopted by the injured limb in both cases is almost the same : relaxation of all the joints, apparent shortening of leg, adduction with possibly crossing of the affected leg in front of or behind the sound one.

The anatomical distortion is also almost indistinguishable. In both cases the tension of the pectineus muscle in the groin is relaxed, resulting from the upward movement of the limb, and the probable partial rupture of the muscle. The great trochanter of the injured leg is much more prominent, and on a higher plane than its fellow. In relation to the ischium, the trochanter may be displaced posteriorly or, more rarely, anteriorly. In dislocation the trochanter is more prominent than in fracture, but varies with the amount of muscle lying beneath the head of the bone.



Cross-section through buttocks.
A represents pressure of finger in the rectum.

In dislocation crepitus is not present, while in fracture crepitus is difficult to elicit without increasing the damage by excessive movement, and causing undue distress to the patient. Mobility of the leg is reduced in each case.

A rectal examination is helpful. For example : injury to the left leg should be examined by inserting the index finger of the right hand into the rectum. Pass the finger along the floor of the pelvis until the pubic symphysis is reached. From there the finger is passed outwards and upwards to the left until the ridge of the ischiatic spine is reached. Running upwards and backwards from this point is the coccygeus muscle, passing between the ischiatic spine and the root of the tail. By pressing the tip of the finger into the fossa in front of this muscle, and above the ischiatic spine, an upwardly displaced femur can be examined. The normal femur is beyond reach.

Careful movement of the affected limb, with the finger internal, and the thumb of the same hand resting on the trochanter at the buttock, will enable the clinician to decide whether the mass held between finger and thumb is great or small. That is, whether the trochanter alone is being examined, in which case a fracture is denoted,

the femoral head remaining in its socket, or whether the mass is great enough to represent the head of the femur and its trochanter, representing, of course, an upward dislocation.

I am of the opinion that fracture of the femoral neck is far more common than dislocation of the hip, particularly in young animals in which the ossification centres of the upper extremity of the bone are still disunited.

Acknowledgment to Prof. J. Share-Jones for valuable suggestions.

A CASE OF PYOMETRITIS COMPLICATED BY ACUTE SEPTICAEMIA.

By J. McCUNN and C. FORMSTON

Royal Veterinary College, London.

THE patient was a three-year-old chow bitch. The history was that she had been mated in the usual way, and was due to whelp on December 6th, 1930. She was brought to the College on the advice of Capt. Smithers, M.R.C.V.S., on November 19th, 1930. For four days she had been ill. She was off her food. For two days she had been sick, restless, showing signs of respiratory distress. For four days she had discharged a prune-coloured fluid per vaginum. The owner thought that the puppies were dead.

On examination, the respiration was rapid and shallow, the pulse full and bounding, and there was a temperature of 105° F. The visible mucous membranes were injected, œdematous, and of a dirty-red colour. Externally there was none of the usual signs of pregnancy. The vaginal discharge was noted. On examination of the abdomen, the abdominal walls were rigid and tender. On deep palpation, a large swelling, which was of fairly hard consistence, was felt. This lump was not apparently fixed in the abdomen. On further manipulation it was appreciated that it was oval, its length appearing to be approximately twice its thickness. Its anterior and posterior extremities were clearly defined. There was tenderness on deep pressure. Examination per rectum revealed that the body of the uterus was enlarged, and the posterior end of the lump could be palpated. The urinary bladder was moderately distended, but it was easy to define it as being separate from the lump. Examination per vaginam revealed an *os uteri* which was pouting in character, was open to the calibre of the pointed end of a pen-holder. The vagina was injected, and contained a quantity of the previously-

mentioned discharge. A diagnosis of Purulent Metritis, complicated by the presence of a decomposed fœtus, was made.

It was decided to operate.

The animal was chloroformed, there being no preliminary administration of morphia. It is our experience that in septic conditions, or in the acute abdominal conditions, the use of morphia is contra-indicated.

On exploring the abdomen, a large distended uterus was found. This was excised in the usual manner. The uterus was intact. There was apparently no general peritonitis. The contents of the uterus were of the nature usually associated with pyometritis. After excision of the uterus search was made for the large tumour previously felt. The tumour proved to be the spleen, which was enlarged, being approximately six inches long and three to four inches wide. It was distended, oval in shape, with rounded borders and ends. Its colour was of a very dusky red. Along its free border, and encroaching to some extent on its surfaces, it was covered by a considerable deposit of fibrin. This fibrin was of a greyish-white colour, and could only with difficulty be removed. Such areas as were removed left an oozing surface. The spleen resembled clinically the septic spleen found in the human. The presence of fibrin was attributed to a local peritonitis. The cause of this septic reaction of the spleen was attributed to the primary sepsis present in the womb, and the general septicæmia which had supervened.

No surgical treatment was applied to the spleen. It was replaced and the abdomen closed. It was hoped that the removal of the primary focus would lead to resolution. This proved to be the case, and a good recovery was made. The spleen had resumed its normal size in three days, and all the general signs of septicæmia had passed away. In three days the bitch was feeding. The abdominal wound healed by first intention, and the patient was discharged on December 10th, 1930.

TWENTY-TWO YEARS' EXPERIENCE OF THE VENTRICLE STRIPPING OPERATION FOR ROARING.

By FREDERICK T. E. HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E.

Professor of Surgery, Royal Veterinary College, London.

It is now some twenty-two years since the ventricle stripping operation for "roaring" in horses was introduced into England, the first two cases being operated upon by Professor W. L. Williams,

of the Cornell Veterinary College, who very kindly, at my request, showed me the method of operating which he had adopted.

Originally essayed by Professor Günther, of Hanover, the ventricle stripping idea was abandoned after a fairly prolonged trial, on account of the high proportion of fatal sequelæ. In those days antiseptics and anæsthetics were not used as freely as they are to-day, and to this may, possibly, be attributed these fatalities. Professor Williams, in the two cases which were the subjects of the demonstration, made an incision into the larynx about three or four inches in length, using a saw to cut through the thyroid region. This method has since been much modified, and now it is usual to perform the complete operation through the crico-thyroid ligament alone, without damaging either the thyroid or the cricoid cartilage.

In those days the left side only, *i.e.*, the ventricle behind the one paralysed cord, was the only one stripped, the mobile cord of the right side not being interfered with. Nowadays it is more usual than not (and, in my opinion, the better plan, except in certain individual cases) to strip both ventricles at the one operation. The use of one or other patterns of " burr," or the gripping forceps, in preference to stripping the mucous membrane of the ventricle off with the finger, is a matter for personal selection, and depends upon the choice of each individual operator.

That the operation has come to stay, and that it is much preferred by owners of hunters and draught horses instead of the insertion of a tracheotomy tube, are now facts beyond dispute ; although for the racehorse, whose job lies on the flat, the tube still holds it own, for the simple reason that the horse can be raced within a few moments (if desired) after its insertion, whereas after the ventricle stripping operation a rest of about six or eight weeks is advisable ; and a rest of six weeks to a racehorse means a further period of several months' training before it can be got " fit " again.

For horses " over the sticks " this operation holds its own against " tubing " ; and in every case of a hunter or a draught horse an owner naturally prefers an operation, such as this, which leaves no visible disfigurement, instead of an unsightly tube and the unpleasant attention which has to be given continuously to the orifice in the shape of keeping it clean ; and, in some instances, of continually having to call in the veterinary surgeon to remove granulation tissue.

From some 22 years' experience, not only in Great Britain and Ireland, but in several countries on the Continent, on more than 3,500 individual cases, many of which have done five, and even seven, seasons' hunting afterwards, I think the following summaries of opinion to be fair statements of fact to put before the profession :—

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(1) That the ventricle stripping operation in horses has now become firmly established amongst those which the veterinary operator can write down amongst those at his disposal for the relief of roaring in horses.

(2) That it is of value in horses of all ages. In fact my own experience leads me to prefer to operate upon an adult or aged horse rather than a two or three year old. There is less risk of getting ossification of the larynx as a sequel.

(3) That it is an operation which will alleviate the tendency to dyspnœa, and make a useless animal into a useful one in about 85 per cent. of hunters and 95 per cent. of carriage and cart horses. Some will still be more or less noisy when galloping, but about 20 per cent. become sufficiently sound in wind to pass the average hunting man without comment, and even to obtain a certificate of soundness from a veterinary surgeon.

The "grunt," however, may still remain if it was there before operation; or it may even appear afterwards—not necessarily, in my opinion, anything whatever to do with the operation.

(4) The untoward sequelæ to be aware of are those of spasm of the larynx (usually immediately after operation) for which one should always be prepared by having a bent tube ready for insertion in the operating wound; dyspnœa, which may occur within three days after operation, and, to guard against this, the tube should also be at hand; septic infection of the wound; ossification of the larynx; and such a sequel as tetanus, which might, of course, happen from any wound. If ossification occurs and dyspnœa arises, one has always tracheotomy to come back to as a remedy; and there is the further advantage in favour of ventricle stripping in that it does not detract one little bit from the insertion of the tracheotomy tube.

ARE NUTRIENT ENEMATA OF VALUE IN ANIMALS?

By W. P. BLOUNT, M.R.C.V.S.
Derby.

THE canine practitioner occasionally meets cases where it is thought necessary to administer food material *per rectum* instead of *per os*, and simple though the act of giving a nutrient enema is, the rationale is indeed complex.

"Nutrient" enemas have been used in medical practice for at least 2,000 years. Aurelius Cornelius Celsus (30 B.C. to 38 A.D.)

one of Rome's most intellectual patricians, mentions this in his eight-volume medical influential text "*De Re Medicina.*" Further confirmation is found in the writings of the Greek Galen (129 to 201 A.D.). More recently, Landois and Stirling (1885), in their text-book of Human Physiology, quote the successful injections of unchanged fluid egg albumin (Voit and Bauer, Czerny and Latschenberger), and of milk (Eichhorst). Instances of the practical absorption of other materials from the lower bowel are recorded by Smith (1921), who mentions the killing of animals by the rectal injection of strychnine. He also quotes Colin, who destroyed a horse by means of nux vomica injected into the cæcum. It is known that general anæsthesia may easily be produced in small animals and man by rectal injections of ether, chloral, etc. Professor Wright, of the Royal Veterinary College, London, has more recently demonstrated the value of Avertin as a general anæsthetic for the dog and cat when injected into the colon.

Unfortunately this mass of evidence in favour of the practice is prejudiced by important carefully-controlled experiments which show clearly that, as the means for supplying body tissues with *food*, the materials injected into the *rectum and lower bowel* are practically valueless.

Presuming that the patient has no other source of nourishment to sustain life, the enema must contain essentially water, proteins, minerals and, presumably in the majority of cases, some carbohydrate, and possibly vitamins. Neither fibre nor fat are necessary for life in the type of case where so-called "artificial feeding" is employed. Water and minerals such as NaCl are necessary, because although stored in the tissues normally, this supply can never be high, since there is continual loss *via* the kidneys, lungs, sweat and lachrymal glands. Proteins provide amino acids for nitrogenous metabolism, and as these are *never* stored, adequate supplies are required regularly. Carbohydrates are stored as glycogen and fat, so that their supply should be abundant, but frequently it is seen that during short periods of starvation, the mechanism which controls their combustion is faulty, for acidosis occurs. It is usual, therefore, to include in the enema an easily assimilable form of carbohydrate. The question as to whether to include vitamins is more difficult to answer, for few are stored or elaborated in animal tissues. Vitamin A, although anti-infective and growth-promoting in action, cannot be considered essential; vitamin B assists growth and aids peristalsis: it is a specific antagonist to Pellagra and Beri-Beri, and is concerned in the functioning of the nervous system, but cannot be considered essential to maintain adult life. Water soluble vitamin C (the most

easily destroyed of all vitamins), is certainly not essential for life, although definitely anti-scorbutic in function. Vitamin D is concerned in calcium-phosphorus metabolism (rickets, dental caries, etc.), and should exist in the body in some degree, since it is apparently formed by the action of ultra-violet light on certain " sterols," and need not therefore be further considered. Finally, we can ignore Vitamins E and F, since they are only concerned in sterility and lactation. It thus appears that although vitamins are necessary for health and growth, they require no place in the composition of a nutrient enema when given to maintain life for short periods.

It was formerly the practice to utilise substances like milk, egg-white, sugar, etc., but gradually surgeons came to realise that physiologically the body absorbs its nutrient material in a completely digested state: proteins as amino acids, and carbohydrates as monosaccharides (fats being unnecessary). Peptonised products were then employed to imitate gastric digestion, but the more thoughtful practitioners used " pancreatised " foods, in the hope that they were presenting completely digested foodstuffs. Laidlaw and Ryffel estimated that the nitrogen output in a case of rectal feeding during coma, with peptonised milk, eggs, and starch, was approximately equal to that obtained in the later stages of fasting. Langdon Brown, one of our most brilliant physicians, who always practices with physiological principles behind his methods, carried out several carefully controlled experiments in order to see if the output of urea (the nitrogen from which is mainly exogenous and, therefore, obtained from the food) in the urine *increased* after using various nutrient enemata. He found that his pancreatised foods gave no greater output of urea than did the ordinary standard enema. He concludes: " if any protein is absorbed from ordinary nutrient enemas, the amount is so little as to make it hardly worth while "; and, later: " for the ordinary nutrient enema containing fat and protein there is, in my opinion, no place left to-day in therapeutics." Better results were obtained by Rendle Short and Bywaters, who employed a pancreatic extract, allowing it to act on milk for twenty-four hours; but in preliminary experiments Langdon Brown did not get the same degree of success.

It was subsequently thought that by using *deeper* enemas, foodstuffs might be conveyed direct to the *small* intestines, so as to facilitate absorption. Church had observed that some of the contents of a soap-and-water injection reappeared at a duodenal fistula in one of his patients; but Boyd, using fine charcoal particles in experimental injections *per rectum*, was unable to demonstrate charcoal in the stomach of the man afterwards. In any case it would appear that

the bulk of the enema would probably have to be so large as to make it very difficult for the patient to retain. It is stated (Samson Wright) that a barium enema, injected at a pressure of 18" is strong enough to allow material to flow into the ileum.

With these *a priori* considerations the veterinarian may at first wonder if it is worth while attempting to feed his canine patients any other way than by mouth, but the following types of cases are a few of the many which nearly always need artificial feeding: Dogs unable to swallow, due to pharyngeal paralysis, or intense inflammatory states of the fauces; œsophageal rupture or stricture, or after operations involving the œsophageal coats; peracute hæmorrhagic gastritis; ulceration of the stomach or duodenum; complete exhaustion following exposure to cold; major operation; accidents, etc.

Concerning the functioning of the various organs involved, our knowledge seems adequate. Food material having been digested in part by the stomach, and completed by the pancreas and intestinal juices, is absorbed *via* the delicate villi of the small intestines. The residue passes by peristaltic waves towards the terminal portion of the ileum, where it is prevented from reaching the large bowel by a muscular sphincter, the ileo-colic valve, generally known as the ileo-cæcal valve. (Bauhin's valve, 1579. First known to Rondelet, 1554.) The control of this sphincter is not completely understood, because, although its tonicity is maintained by the sympathetic nerves (Wright, Samson), and stimulation of the vagus is said to have no effect over its control (Elliot), the normal relaxation factor must differ from that of man, where a *gastro-ileal reflex* occurs. At each succeeding meal this reflex action is instituted, due to the presence of food in the stomach; peristaltic waves are initiated whereby the ileo-cæcal valve repeatedly relaxes and small quantities of the ileal contents pass through. As many dogs are fed *once* daily only, this would appear to be an insufficient stimulus to relax the valve. Presumably, therefore, peristaltic waves in the terminal portion of the ileum of the dog are excited more frequently than in man, and quite apart from the presence of food in the stomach. As such waves reach the sphincter, food will be allowed to pass into the cæcum and colon.

The large intestine of carnivora is short—shorter than in any other domestic mammal, including man. Its functions appear mainly to be concerned with the absorption of the fluid non-nutritious portion of the food residue, namely, water, thereby "forming" the fæcal matter into a semi-solid state. Small quantities of mucin are secreted to assist in the lubrication of the bowel for the passage of the fæces, whilst certain mineral salts, namely, calcium, phosphorus,

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iron, etc., may be excreted. The passage of the undigested residue, received from the small intestines, is retarded, due to the presence of so-called anti-peristaltic waves in the cæcum and ascending colon. These are really retrograde rings of constriction, a reverse series of rhythmical segmentations, not true anti-peristaltic waves. Dutch workers have shown that dogs may live healthily after resection of the lower bowel for at least twelve months.

It is clear from a study of the microscopic structure of the mucous membrane of the dog's cæcum and colon, that there are no delicate villi such as seen in the smaller calibre intestines. This obviously suggests that only the simplest of enemas will be absorbed there, actual nutrient material needing to be predigested and passed deeper into the ileum or jejunum. That this can occur is claimed by American veterinarians, but we have also adequate proof on this side of the Atlantic. John Steward (Hereford) was, I believe, the first to demonstrate the fact that by raising the hind quarters of a dog and by using a long piece of rubber tubing to which is attached a funnel, fluid can be made to pass forwards from the rectum to the stomach, where it may be vomited. Chambers confirmed this, and at one time practised the giving of deep enemas containing antiseptics like Dimol for the treatment of acute enteritis. The author has on several occasions made cats, dogs and even rabbits vomit (after deep rectal injections) a part of the injected material. To prove that it was actually the same fluid as introduced by the rectum, methylene blue was added, and some of the blue-tinged fluid was expelled by the stomach through the mouth to the exterior. There are doubtless many other practitioners who have found how easily fluid can be made to enter the small intestines *via* the rectum in small animals

It has been observed in man that acetone and diacetic acid occur in the urine within forty-eight hours of the commencement of a period of starvation, but dextrose solution can definitely be absorbed by the large bowel and prevent this onset Reach proved this by observing the rise in the respiratory quotient after rectal feeds of glucose. Halpern fed a man with an œsophageal stricture for thirty days by daily rectal injections with thirty grammes of grape sugar (glucose) ; no acetone occurred in the urine. Mutch and Lyffel advise the use of a 6 per cent. solution ; Beddard recommends from 10 per cent. to 20 per cent., but Langdon Brown prefers 5 per cent.

Practical Applications.

From the foregoing observations it is apparent that the practice of injecting nutrient material per rectum in the dog is not comparable with that of man. The essentials to its success are as follows :—

(1) Prepare a Suitable Fluid.

It is obvious that solid nutrient suppositories are valueless, since the large bowel can only absorb simple fluids.

In the preparation of the enema three chief points need to be considered :—

(*a*) *Quantity.*—For an average size 20 lb. terrier, 25 ounces should be adequate. Up to half a gallon may be necessary for a Great Dane ; whereas only about 6 to 10 oz. will be required for a Pekingese.

(*b*) *Temperature.*—At the time of injection the fluid should preferably be just above that of the normal body temperature of the animal, say, 105° F. For, although speaking generally, the viscera are completely insensitive to temperature stimuli, in the rectum protopathic temperature sensibility is probably present. At the suggested temperature the mucous membranes concerned would be better able to absorb fluid, due to the slight vasodilation conditioned by it.

(*c*) *Quality.*—The fluid to be injected should contain : (i) *Water* ; (ii) *Sodium Chloride*, 2–5 per cent. ; (iii) *Glucose* (dextrose, grape sugar) 5 per cent. ; and, if further nourishment is required—

(*d*) *Pancreatised Essence of Meat or Milk.*—To the food to be digested (pancreatised) add 0.5 per cent. sodium carbonate (which is the co-partner to trypsin, the proteolytic ferment of the pancreas), and also a reliable extract of the pancreas in requisite quantity. Bengers' Liquor Pancreaticus is to be recommended. Maintain the mixture for thirty minutes at 37° C., and use as required.

(*e*) *Fat.*—If it is thought advisable to include fat (and milk is not being used), the yolk of an egg is considered to provide the next best form of easily digestible fat. This should be pancreatised as in the case of the meat essence.

(*f*) *Fruit Juice.*—A small quantity of raw fruit (grape, orange, etc.) may be added, because in addition to supplying glucose, vitamin C would be included ; but it is superfluous.

(*g*) *Alcohol.*—Alcoholic stimulants, of which brandy is the best, may be necessary in certain cases ; they act as cardiac stimulants, and further abolish ketosis. One teaspoonful is sufficient.

(*h*) *Tinc. Morphia.*—Although a common constituent in human nutrient enemas, there is no need to include it for the dog because, if properly administered, the patient will seldom, if ever, eject the contents.

When the fluid is thoroughly mixed it should be tested for its acidity by litmus paper, and if still acid a drop or two of ½ per cent.

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sodium carbonate solution added until the reagent turns blue. This then ensures that the fluid shall be as nearly like the duodenal contents as possible; until actually ready to inject the mixture, preserve the temperature by keeping the fluid in a thermos flask.

(2) Apparatus.

No special pump is necessary; an ordinary Higginson's enema syringe is quite useful, because the intelligent practitioner can then so readily detect if there is obstruction to the flow. "Double-action" pumps are undesirable, because they are usually too forceful to allow the operator to detect the presence of slight impediments to the flow. Five feet of rubber tubing of suitable bore and a funnel are all that are really necessary, in which case no pump or syringe is used, and this method will rarely be ineffective.

(3) Procedure.

Having lubricated the first two feet of the rubber tubing with oil or vaseline and filled the apparatus with the fluid, the nozzle is gently inserted through the anus into the rectum; as the fluid flows forward so may the tube be inserted deeper into the intestines. The rate of flow may be gauged by raising or lowering the funnel, since the fluid is regulated by the force of gravity. A spring clip may be attached to the tubing near the funnel if required, and similarly the funnel may be clamped in position (to eliminate the use of an assistant) by the use of a retort stand or similar apparatus, as mentioned by Hamilton Kirk when writing on rectal anæsthesia. The operator may wrongly suppose that the rubber tubing has entered the small intestines when in reality it has doubled back on itself; this can easily be detected by noting the stasis of the fluid in the funnel. If the fluid flows freely there is no need to advance the tube more than about 15 in., as it is almost certain that the fluid is being conveyed direct into the small intestines. If the fluid fails to enter the colon, the backwash through the anus may need to be prevented either by raising the hind quarters, or compressing the anus with a cotton-wool pad, or by removing the cause of the obstruction. Unless the lower bowel is full of hard fæcal matter, there is no necessity to give a preliminary enema to cause its removal. The warm nutrient enema will quickly penetrate past any simple fæcal contents.

The most important factor is to give the fluid slowly, taking as long as ten minutes if necessary. By this means fright and pain are avoided; the animal does not strain, and the material is allowed to penetrate

gradually past fæcal obstructions so as to reach the ileo-cæcal valve, and thus, under optimum circumstances, it will enter into the ileum.

Physiological Characteristics.

Five observable phenomena are known in connection with the distension of the rectum :—

(1) Straining movements are initiated as in the act of defæcation.

(2) Sympathetic stimulation occurs from fear (sometimes from pain due to over-distension of the organ), and one of the reflex effects of this will be to add tonicity to the ileo-cæcal valve.

Both these phenomena should be avoided if at all possible; hence the necessity for gentleness, simplicity yet efficiency of apparatus, and for ensuring that the flow is slow and even.

(3) A secretion of gastric juice follows (Umber). This is only of consequence when the patient is suffering from ulceration of the stomach or duodenum. It may then be modified by giving hydrated bismuth *per os*.

(4) Stimulation of the rectal mucosa may produce a depressor effect on the vaso-motor system, but this is of temporary duration, and its effect is not intense. It would in all probability be overcome by the sympathetic stimulation (*see* 2), or later by the absorption of the alcohol.

(5) Enemata induce anti-peristaltic movements in the ascending colon and cæcum, which will therefore be of benefit to the animal in assisting the retention of the fluid near the ileo-cæcal valve orifice. Whether, in addition, similar anti-peristaltic movements are evoked in the small intestines is still debatable, but the writer believes that such retrograde movements occur with far greater frequency in the dog than in man ; and further, that they are initiated by deep enemata.

The only condition which should withhold the giving of the *whole* of the enema to the patient is that of vomiting some one or two minutes after commencing the injection, thereby demonstrating that the fluid has already traversed the full length of the alimentary canal. Finally, it is advisable to note what quantities have been used in the operation, and approximately the body-weight of the dog, so that there are actual figures to use as a guide when the next case occurs.

Conclusions.

From the foregoing remarks it is reasonable to conclude that the surgeon may confidently expect real value to accrue from the giving of a *suitably prepared* nutrient enema to his canine patients—probably also with cats and rabbits—provided the fluid is injected with a view to absorption by the *small intestine*, rather than by the colon.

"KNOCKED-UP TOE" IN RACING GREYHOUNDS.

By J. McCUNN and C. FORMSTON.

Royal Veterinary College.

As a result of track racing the injury known to trainers and owners as "knocked-up toe," or "hammer-toe," has become increasingly frequent. Many good dogs have become permanently incapacitated by this injury. The site of the lesion is the first inter-phalangeal articulation which becomes involved in an articular and peri-articular inflammation. The cause is undoubtedly traumatism, which may be direct, *i.e.* the result of concussion, or indirect, as a result of strain. There is no doubt that the second cause is the more potent. The conformation of the foot has much to do with the condition, for in the dog well up on his toes it is rare. In the flat or splay-footed dog it is common.

The onset, as in all cases of trauma, is sudden. The usual history is that the dog pulled up lame or was painfully lame on the morning following a race or trial. An inspection will reveal pain in the joint, and there may or may not be swelling. Often the pain is so acute that one is justified in suspecting fracture. In from twelve to twenty-four hours the joint swells, and there is evidence of a peri-articular œdema. If the phalangeal bones are manipulated there is evidence of fluid, *i.e.* synovitis, in the joint and consequent separation of the joint surfaces. There is little if any hæmorrhage. The pain subsides gradually with the onset of the swelling. A peri-articular fibrosis sets in. As the acute condition subsides it leaves an enlarged and weakened joint which readily breaks down under strain, with lameness as the frequent sequel. It is seldom that there is any bone lesion, especially of the articular surfaces. Rupture of one or both of the lateral ligaments is a common complication. Injury of the extensor or flexon tendons is rare. The injury varies considerably in extent, and it may be classified as follows: (1) A simple synovitis accompanied by an excess of synovial fluid. (2) A peri-articular injury with or without synovitis. (3) 1 and 2 with rupture of the lateral ligaments. (4) A combination of 1, 2 or 3, plus fracture.

The large toes are the most frequently affected, and of these the inside or third digit shows the greatest incidence. The conformation of the toe is lost, and severe twisting is often present.

Treatment.

This depends on the degree of injury. In the simple uncomplicated case of synovitis, rest with local treatment and massage generally effects a cure in a few days. It is probably advisable to start with a poultice to remove the pain followed by iodine or mercury preparation locally. Ultra-violet ray treatment meets with a ready response. In the more grave cases this type of treatment is quite effective to make the dog sound at the walk, but the joint will not stand up to strain. Blisters of various kinds have been tried, but we have had most success following on the use of the actual cautery. The joint is point fired in its dorsal and dorso-lateral aspects, care being taken to prevent any rubbing by the adjacent toe. The firing is followed by a blister of tinct. iod. fortis, and the foot is bandaged. The bandage is removed after three days, and complete rest is essential. The object of the operation is to try if possible to get some degree of anchylosis in the joints. Movement must be limited if the joint is to remain free from pain. The anchylosis may be bony or fibrous, this depending to a considerable extent upon the severity of the firing.

In bony anchylosis all movement of the toe is, of course, performed in the third phalangeal joint, and in the metacarpo or tarso-phalangeal joint. In these cases it is advisable to shorten the nail, and by means of a file, keep it short in order to limit the leverage and strain.

Where there has been rupture of the lateral ligaments, we have had recourse to mechanical fixation of the part by wiring. In many cases we have found this to be of exceptional service. The operation is simple and convalescence is short. There is no necessity to remove the wire. Silver wire is used, and the bones are drilled with a simple drill. It is essential that asepsis should be observed. The twisted portion of the wire must be flattened and buried.

In cases where lameness persists after wiring, the wire can easily be removed, and often the joint will then stand strain. In a recent case the wire had broken, and on its removal it was found that the bones were being kept in position by means of a ring of new fibrous tissue resembling a thickened capsular ligament. In this case there had been a complete dislocation with rupture of both lateral ligaments. In certain cases one has to resort to amputation. In these cases we would stress the advisability of leaving the pad intact. The bones of the toe, as high as the middle of the first phalanx, may be removed without interfering with the serviceability of the pad. It is not necessary to amputate at a joint, as best results have been obtained

when we have amputated through the centre of a bone. For the amputation of bone a pair of bone forceps, preferably the guillotine type, is useful. Fractures involving the joint are occasionally troublesome owing to non-union. In these cases, deep point firing is often effective.

Another source of trouble involving the toe is the so-called " split nail." In our experience these seldom or never heal without surgical interference. Even if the nail is removed, an open sore is left, which heals with difficulty. Often it granulates and causes continuous pain and lameness. There is continual bruising. The most successful treatment appears to be removal of both claw and third phalanx, and suturing, when it usually heals by first intention, the pad preventing further injury. In these amputations of toes, whether of second or third phalanx, the incision is not made longitudinally, *i.e.* in the direction of the toe, as advocated in most text-books, but in the transverse direction.

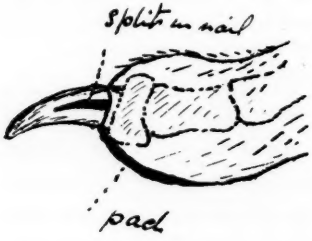

FIG. I

Showing relative positions of pad, nail, and bones.

FIG. II

The dotted line indicates incision.

FIG. III

After operation, showing how the pad is brought in upward direction to protect end of toe.

The advantages claimed for this method are: (1) The pad is more easily preserved, and since it is brought upward it protects

the end of the toe from further injury. (2) When pressure is put on the toe the edges of the wound are forced together instead of a tendency to be forced apart as in the longitudinal incision. (3) There is less wrinkling and distortion.

In conclusion, we do not advise precipitate amputation of toes. Surgery is conservation, not mutilation. A dog with toes intact is generally better than one with a toe or toes missing. If all else fails, amputation can be justified as a last resort.

A PHARYNGEAL CYST CAUSING TEMPORARY ASPHYXIA.

By R. HUDSON, F.R.C.V.S.

Retford.

THE subject was a four-year-old Shire gelding. Over a period of five months he had had three seizures, and fallen when at work. On each occasion it was thought that he would die, but after struggling for breath for some time he gradually rallied and regained his feet, carrying on with his work without further hindrance.

After the last attack I was called in to see him. My examination of his heart, pulse, harness, revealed nothing likely to cause the trouble, and while wondering what the cause could be, the attendant informed me that he made a peculiar noise when he swallowed water. On trying him, I found he did. The noise, instead of being one clean gulp, was broken and muffled; also, there was a trickle of water down the nostrils with a thin mucous discharge from the right. Introducing my hand into his mouth, I examined his pharynx as far in as my fingers reached. Through the restricted entrance I found the mucous membrane much thickened, with nodules here and there, but nothing likely to cause suffocation. I tried again, this time trying to reach the posterior nares, and for as long as I was able to keep my hand in, still found nothing.

The next time I decided to examine his larynx, and succeeded in reaching over the epiglottis down the arytenoids, and about the anterior of the vocal cords—nothing—yes, for something like a soft egg had slipped into my fingers just as I was withdrawing my hand. It was a large pedunculated cyst attached to one side of the base of the epiglottis.

I found that when my hand induced swallowing, the cyst was swallowed and held out of reach during the time my hand was

in position, and it was only after waiting for relaxation of the pharyngeal muscles that the cyst came forward and enabled me to detect it. I had examined without a mouth gag, so was rather at a disadvantage.

A few days later he was cast, and with the aid of a long ecraseur with a wire loop, the cyst was removed without much difficulty, and the horse was put to work. It measured two inches in diameter. The explanation of the asphyxia appears to be that, when the horse became tired at work, and the laryngeal opening more open and less sensitive, the cyst, floating about, was sucked into the larynx and held until partial suffocation caused relaxation of the larynx and allowed it to spring away.

It is the first time I have come across anything in the nature of a tumour in the pharynx of the horse, but I have met with them in cattle when they have felt like pedunculated papilloma. One, in a bullock, was so large that it took several swallows to carry it down the œsophagus after I had failed to hold it when removed.

TORSION OF THE RECTUM IN A MARE.

By Lieut.-Colonel H. T. RYAN, D.S.O., F.R.C.V.S.

Cork.

As I cannot find any record of a twist of the rectum having been reported in veterinary literature, the condition is evidently very rare, so I thought a short note on the one and only case I have come across might be of interest to your readers.

I am prompted to report the case, as if I had been called in early I would probably have attempted laparotomy, although the result might not have been successful. If I came across a similar case now, and was called in early and knew what to expect, I am certain I could make a much better job of it, and in all probability cure the animal.

The subject was an eight-year-old light draught mare, about 16.1 hands high, the property of a contractor who had sixteen other horses in his stable. On October 27th, 1930, she got her first and only colic at 8 a.m., after her morning feed. The owner treated case till 4.30 p.m., when he called me in.

The first thing I noticed was the swollen and abraided condition of the area round the vulva and vagina, the lips of which were protruding. I thought there might be some malicious injury to the vagina, but on

exploration could not find any wound ; only a very swollen and bruised condition of the passage, with a tympanitic bowel pressing all round. On examination of the rectum, about 18 in. from the anus, I could feel a twist to the right. The twist was not very tight, but owing to the bowel moving forward and to lack of reach, I was not able to get my hand beyond it. The animal was able to pass small quantities of fæces and flatus.

I tried to undo the twist per rectum, but found it impossible. The mare was sighing and sweating, with a very weak running-down pulse. She was in a small loose box, but not large enough for her to roll completely over. I passed a trochar and cannula through the wall of the vagina, and a lot of gas escaped. I again tried to reduce the twist, but without success.

I explained the condition to the owner, and told him I would have operated on the case if I had been called in early, but that an operation in the animal's present condition was out of the question, and that she would probably die. I decided the only chance of reducing the twist was to stimulate peristaltic action and to get the patient to roll, so gave a hypodermic injection of 1½ grains of Arecoline, and had the animal removed into a large loose box with a good bed. She rolled a few times, but things did not improve. I left a humane killer with owner, and told him to shoot the mare in one hour's time if she was still in pain, as the case was hopeless. She died at 10 p.m. the same night.

Post-mortem next day revealed the twist I could feel per rectum, but there was also a similar twist of the single colon. There was very little ingesta between the two twists, so I presume a portion of bowel became inflated with gas and rolled over, thus producing torsion in two places ; or perhaps it would be more accurate to state two half-twists, and this would account for the animal being able to pass small quantities of fæces and flatus.

If one knew what to expect and had a sufficiently large sterile sheet at hand, I am sure it would be possible to reduce such a twist by performing laparotomy, but of course the operation should be attempted before the pulse was beginning to run down, such as in this case.

Whilst the animal was alive the swollen condition of the vagina was the most marked symptom, and the bruising was probably due to the protruded tissues coming in contact with the stable wall ; or perhaps to the mare sitting on her haunches before my arrival.

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THE "COMPOSITION" RUBBER BALL AND RADIOGRAPHY.

By G. W. CLOUGH, D.Sc., Professor of Chemistry, and M. J. EDE, M.C.R., Honorary Radiographer,

Royal Veterinary College, London.

On one or two occasions radiography of a canine patient has failed to produce definite evidence of the presence of the suspected foreign body which the subsequent sequel has proved to be present in the stomach or intestine The following case brought the matter to a climax and caused an investigation into the whole question.

The patient was a Collie dog, nine months old, which was sent to the College by the veterinary practitioner in charge of the case, with the history of a swallowed ball. An X-ray was taken, and as the resulting skiagraph failed to reveal any evidence of anything of the kind in the stomach or intestine, the owner was informed that the dog could return home.

On the way back the dog had a fit; during which vomiting took place, and a ball was ejected. Unluckily the animal died, and the owner was very angry that his word in regard to the dog having swallowed a ball had been doubted.

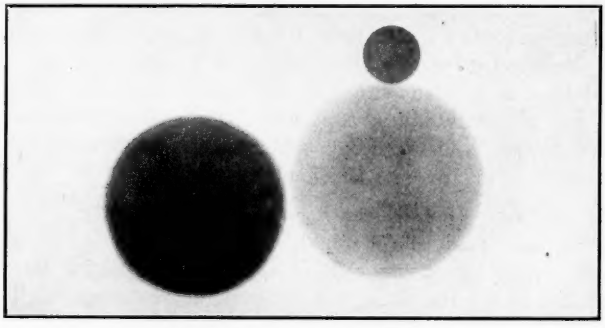

FIG. 1.—Skiagraph of two balls, one of rubber (left) and the other of composition, exposed outside the body on a photographic plate. Also a small metal coin.

As a further and very critical examination of the skiagraph still revealed no outline, or even a suspicious shadow of a ball, it was decided to make some radiographic tests in order to endeavour to

solve the mystery. For this purpose the ball which this dog had swallowed was exposed under the X-rays on a photographic plate side by side with a rubber ball which had been originally swallowed by a bulldog (for whom gastrotomy was successfully performed), and which had been clearly diagnosed by radiography.

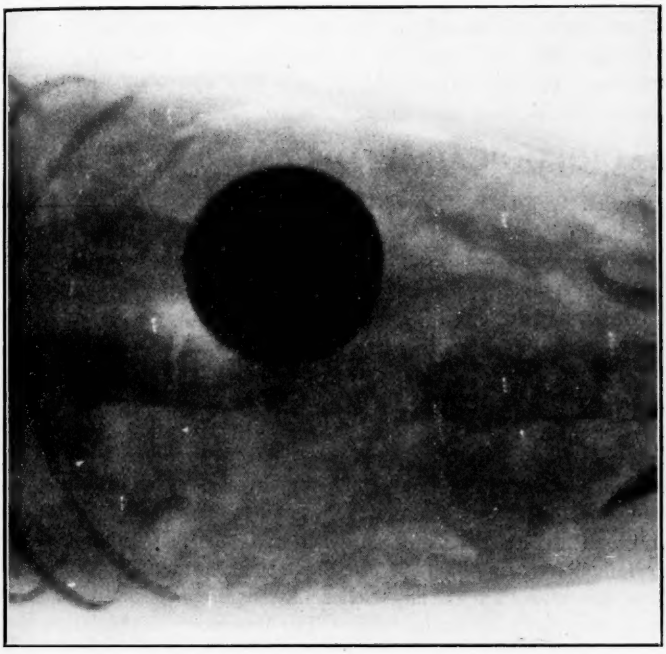

FIG. 2.—Skiagraph in which both balls were placed inside the stomach of a dead dog. The rubber one shows, whilst the composition ball is not visible.

Fig. 1 shows the result, which was most interesting. The ball swallowed by the bulldog gave a distinct and very definite impression on the plate, whereas the ball vomited by the dog in the case mentioned above showed only a very faint shadow; and when the same contrast was still further tested by inserting the two balls in the stomach of a dead dog, and skiagraphing them through the body, the one ball showed clearly whilst the other did not show at all. A chemical analysis was made of each, with the following results: The ball which was transparent to X-rays contained 3.6 per cent. of mineral matter, which was mainly magnesium oxide. The ball which was opaque to the rays contained 30 per cent. of

mineral substances, which consisted mainly of lead oxide and zinc oxide. It would thus appear that vulcanised rubber containing no added ingredients ("fillers") is transparent to X-rays, but that an appreciable amount of mineral matter renders it opaque to the rays. This was confirmed by the analysis of another one, a rubber golf ball, which had been revealed in a skiagraph; this contained 12 per cent. of antimony sulphide. The specific gravity of the "transparent" ball was 1.00, that of the ball containing lead and zinc was 1.48, and that of the ball containing antimony was 1.12.

RADIOLOGICAL PROBLEMS IN ANIMALS.*

By R. W. A. SALMOND, O.B.E., M.D., Ch.M., D.P.H., D.M.R.E.

In the X-ray examination of animals there are, of course, obvious technical difficulties, rising to impossibilities with the larger ones. There was a joke in one of the comic papers some years ago entitled "the optimist." It illustrated someone trying to X-ray the kidneys of a full-sized standing elephant, with a small coil worked by accumulators under its abdomen, and a plate on its back. If this raises a smile in these days, it was a better joke then. Some time ago the writer was asked to X-ray the hind limb of a pigmy elephant, and a fractured bone with a fragment of bullet *in situ* was shown. What impressed one most at the time was the great density of the hide and soft tissues as compared with human. The animals usually examined are less difficult. The smaller ones present few or no technical difficulties, but the larger ones may require a special radiographic or a veterinary operating table. The transport of the larger ones, such as a racehorse or a valuable hunter, may be out of the question, and a portable apparatus is necessary.

Whatever apparatus is used, it should be powerful enough to allow the exposure of any ordinary sized limb being made in the fraction of a second with intensifying screens. This dispenses with the question of an anæsthetic, and also solves many of the other difficulties in dealing with animals. It should be as noiseless as possible, and no part of the tube brought nearer than twelve inches to the animal on account of its hairs being electrified and frightening it. Disappointments and failures in animal radiology are, it is thought, mostly due to faulty technique. As there are no sure means of getting an animal to hold its breath, one has to depend on very rapid

* Opening paper read at a Joint Meeting of the Sections of Comparative Medicine and Electrotherapy, at the Royal Society of Medicine, in December, 1930.

exposures to overcome the movements due to respiration, otherwise the shadows are blurred, especially those of the internal parts.

The most common conditions for which examinations are made are fractures and dislocations, or both combined, and foreign bodies swallowed or embedded in the soft parts. These are so commonplace that they must be familiar to all. It is good practice to reexamine dislocations after reduction to make sure they are really reduced, and it is well to remember that some swallowed foreign bodies, such as corks, pieces of stick, or sponges, may not cast any shadow. Since greyhound racing has become so popular, much work is done in diagnosing fractured toes and dislocations of the toe-joints. Other uses are the determination of sarcoma, endothelioma, and tuberculosis of the long bones of dogs and cats, and diseases of the foot and limb bones in horses, also the detection of urinary calculi in dogs, the size of the pelvis in relation to breeding, and the determination of gestation. The internal examinations as opposed to those of the limbs are more difficult. Compare the natural attitudes of animals with man. The latter quite naturally lies on his back or stands facing you, and you see the two sides of his body quite separate. When an animal is standing or lying quite naturally, the two sides of its body are usually more or less superimposed, but if put in the dorsal position, and the forelimbs drawn up and the hind limbs down, you can then see the two sides separately, and examine for, say, a stone in one or other kidney. Cases are recorded from time to time in which X-rays have failed to show stone when present, and are probably due to the technique rather than the composition of the stone. It is interesting that the chemical composition of stones in dogs is so similar to those in man. By a barium feed the condition of pyloric stenosis in dogs can be determined, or whether a swallowed foreign body is in the stomach or has passed further on. If in the stomach, the opaque fluid will be found to obscure the foreign body. No difficulty need be experienced in getting a dog or a cat to take this meal, in fact they usually take it with a better grace than humans.

The thorax offers less opportunities. The more important smaller animals, dogs and cats, are in this country relatively resistant to pulmonary tuberculosis, but hernia of the diaphragm, opaque foreign bodies in the lungs or gullet, should be detected, and also the less common conditions of hydrothorax, pneumothorax, and actinomycosis. In the larger animals the examination is almost impracticable.

Animal Parasites.—Some of these are found both in man and the lower animals, and so are of medical and veterinary interest. When

calcified or situated in an air-containing space such as the lung, they are readily detected by X-rays. The most important radiologically are hydatid cysts, the cysts of cysticercus cellulosæ and trichinosis. Hydatid cysts are occasionally found while X-raying the human lungs or abdomen, and show a fairly characteristic globular shadow with usually a calcified wall. In the abattoirs these cysts are common, and can be seen infesting the organs removed from cattle, sheep, and pigs. Calcified cysticerci are also occasionally seen in the muscles of man as elongated opacities about one cm. in length, and lying in the direction of the muscle fibres. In those animals infected, namely, pigs, dogs, and cats, they show a similar appearance. Radiography for the detection of both these parasites is, however, not an economic undertaking in animals.

Another problem is that of expense. This may arise, especially in private practice, and if the economic value of an animal is taken into account, the requisite fee may be relatively high to that value, and is a limiting factor to more universal use of the rays. Fortunately, there are other considerations, and when once an animal has found a place in our hearts and homes a high value is generally placed on its life.

The interpretation of the films or screen examination should be done by a qualified veterinary surgeon. The bones of the limbs and spine of animals are different to what a medical radiologist is seeing daily, and if only for this reason, it is thought that animal radiology should be in the hand of veterinary rather than medical radiologists, unless they have had some training in veterinary science. The converse, of course, also holds good. For those veterinary surgeons not conversant with the many pitfalls in radiology, they are advised that a negative opinion on screen examination alone, especially as regards a fracture, should not be relied upon. Films should be asked for, being more accurate and a permanent record.

In radiotherapy much work has been done on the action of X-rays and radium on experimental malignant growths in rats and mice, and has added to the knowledge of the effects of this treatment in allied human tumours. Bearing in mind the results in these animals and man, veterinaries might consider the treatment of sarcoma and carcinoma in dogs by similar or combined means if circumstances permit. It is interesting to note that domestic animals are affected with practically every variety of malignant neoplasm known to pathology. The valuable information on the action of X-rays on the different blood corpuscles in animals has helped in the treatment by radiation of certain blood diseases in man, and might be used in the treatment of canine leucæmias.

XUM

The nutrition value of foodstuffs as regards their vitamin and other essential contents has been demonstrated by the growth of the bones in young animals and their controls by X-rays, and is being utilised in the prevention of deficiency diseases both in man and animals.

The sterilisation of bitches and female cats by radiotherapy, when there is no question of breeding, to prevent the unpleasant events which occur at the œstral periods, might be considered as an alternative to the surgical method of spaying. No doubt these have all been tried, and it would be interesting to hear from our veterinary colleagues any of their results. Published references are hard to find.

While one fully realises that owing to circumstances the veterinary surgeon has to rely mainly on his own clinical acumen for a diagnosis rather than laboratory examinations, the multitude of which it might be said has now almost befogged the medical profession, one cannot help thinking that radiology will be more and more used by the veterinary profession as its value in suitable cases becomes better known, not only amongst themselves, but also the laity; it being remembered that this examination is not meant to supplant the manual examination, but only to supplement it.

In research work, radiology opens an immense and fascinating field in the investigation of the internal functions of animals, many of which are very imperfectly known. In their elucidation, not only would valuable information be gained to veterinary science, but it would have a direct bearing on the better understanding of similar problems in man. The classic observations of Cannon, soon after the discovery of X-rays, on the movements of food in the stomach and intestines of the cat were for long the basis of these movements in text-books on human physiology, and show how very closely related are the problems of human and animal physiology and pathology.

Lastly, as to the future of veterinary radiology. This lies in well-equipped departments in the Veterinary Colleges, Army Veterinary Hospitals, and the surgeries of private practitioners; also in the X-ray laboratories of institutes of anatomy or physiology, and of zoological gardens, but not in hospitals or clinics where humans are examined. My impression is that, speaking in general terms, veterinary radiology has not been developed so much as it might have, and it is surprising to find how little reference is made to it in veterinary text-books. For further progress it is suggested that:— (1) More qualified veterinaries should take it up, just as radiography was taken up by medical men and developed into medical radiology; (2) every veterinary college should have a well-equipped laboratory under proper supervision; (3) radiology should be a recognised part, however small, in the training of veterinary surgeons.

XUM

Parliamentary News

Royal Veterinary College.

In the House of Commons, February 25th, 1931.

COLONEL SIR GEORGE COURTHOPE asked the Minister of Agriculture whether a grant will be available from the Development Fund towards the cost of reconstructing the Royal Veterinary College; upon what conditions it will be made; whether any further grant will be available from other funds; and whether he is aware that in the event of the total sum required being unobtainable the College will not be able to continue its educational work?

THE MINISTER OF AGRICULTURE (Dr. Addison): The Treasury have sanctioned grants from the Development Fund amounting in all to £150,000, provided that the Governors obtain from other sources a sum of £100,000. Other conditions are attached to these grants, and I shall be happy to supply the hon. and gallant Baronet with a statement of them if he so desires; but they raise no difficulty, and have been accepted by the Governors. The hon. and gallant Baronet is no doubt aware that the Governors have themselves raised a sum which I understand is now slightly above £50,000. I can only add that I am well aware of the difficulties of the College.

MR. HANNON: Is it not deplorable that a great national institution of this character should be dependent for its existence on voluntary subscriptions?

DR. ADDISON: I share the view of the hon. Member, but I have to deal with the situation as it is.

SIR G. COURTHOPE: Can the right hon. Gentleman say whether the application to which he referred in the House on a previous occasion for a grant from the Pilgrim Trust has been successful?

DR. ADDISON: I understand not.

VICE-ADMIRAL TAYLOR: Has sufficient money been raised privately to enable the reconstruction work to be carried out, as I understand that it must take place by July?

DR. ADDISON: I understand that there is no use beginning the work of reconstruction until at least £250,000 is in sight. That is not the case at present, and therefore there is no use proceeding. The hon. Member is aware that when this place has been rebuilt, as it ought to be, the expenses of maintenance and salaries will be very greatly increased.

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BRIGADIER-GENERAL CLIFTON BROWN : Is the right hon. Gentleman aware that great efforts are being made by masters of hounds in sending round appeals to their followers, and otherwise by private people, on behalf of this institution, and, in view of the fact that there is a real endeavour to collect this money, will he see that the subscription list is kept open and endeavour to increase it.

DR. ADDISON : I have not closed the subscription list, but I understand that the response from masters of hounds has been much less than was expected.

BRIGADIER-GENERAL BROWN : Give them time.

News

Appointment of a Veterinary Superintendent to the Zoological Society.

AT a Meeting of the Zoological Society of London held on February 18th, Capt. W. P. B. Beal, M.R.C.V.S., D.V.S.M., late Principal Veterinary Officer of the Gold Coast, was appointed Superintendent to the Whipslade Zoological Park, which is the country annexe of the Society. The veterinary profession will read the above with feelings of pleasure, for the appointment at last of a veterinary surgeon to do the veterinary work will remove the reproach which has existed for so long against the London Zoo, and will not only bring it into line with the Zoos of other countries, but will be of material benefit to the health of the animals themselves. The selection of Capt. Beale is an especially appropriate one, as not only is he a veterinary surgeon who is fond of his work and has had considerable practical experience in England, but he is particularly fitted for this duty on account of the recent administrative position which he has recently held as Principal Veterinary Officer to the Gold Coast.

Graduating from the Royal Veterinary College, London, in 1906, he has since taken post-graduate courses in entomology and helminthology at the London School of Tropical Medicine and Hygiene, and the Diploma of Veterinary State Medicine.

During the Great War he was seconded for military service, and served in France, being at the time of demobilisation A.D.V.S. of a Division.

As Superintendent of the Whipslade Zoological Park, Capt. Beal will have many varied opportunities to exercise his administrative, as well as his veterinary skill, for the idea is to so develop the space at disposal that the animals will be kept under conditions as near to their natural surroundings as possible.

He will take up his duties on May 1st.

A Carnival for the Royal Veterinary College Funds.

THE appeal issued by the Editor of *Horse and Hound* has already added more than £2,200 to the College Rebuilding and Endowment Fund, and has been followed up by further appeals to sporting folk from the Editors of *The Field*, *Our Dogs*, and *The Dog World*, all of whom are allowing space in their respective papers for the publication of lists of subscribers. Miss Edith Bradley, the energetic secretary of the South Eastern Jersey Club, has, in addition to an appeal to the members of the Club (which brought back a ready response of more than £100 at once) enlisted the sympathy of the other Cattle Breeding Societies, and there is reasonable hope that they too will follow suit.

A Dance at Newmarket, under the auspices of Mrs. Sadler and a Committee which included Messrs. Brayley Reynolds, Lirock, Leach, Leader, Townsend, and other veterinary colleagues and trainers, has added £100; whilst a carnival dance at Long Eaton, under the auspices of the Greyhound Racing Association, led by our colleague Mr. Heather, M.R.C.V.S., was a most successful affair. The largest event of the month, however, has been a Carnival held by the College students under the able organisation of Mr. Raymond Holmes, a Class C student, and his friendly colleague (also of Class C), Mr. Sam Poles. In collaboration with the President of the Students' Union (Mr. Peyton, of Class D) and the Committee, a most wonderful collection of decorated vehicles of all sorts and sizes (from coaches-and-fours and ambulances, to ox wagons, bicycles, and dog perambulators), assembled in Kentish Town and marched through ten miles of streets, those of the 200 College students who were not occupied on the motor lorries of the procession collecting money from the crowds who were interested spectators.

Over 550 individual helpers were entertained to lunch; the weather was favourable; and the final sequel of this, and a collection (made again by the students) in the West End of London on the following day, has added more than £700 to the Funds for the Poor Out-Patient Department, which was the ostensible object for which the Carnival was organised. A Fancy Dress Ball was held in the evening, and the prizes (which included silver cups and such valuable presents as gold and silver wrist watches, cigarette cases, etc.) will be presented to the successful competitors on Wednesday, the 18th, at 5.30 p.m., in the large lecture theatre of the College, by Lieut.-Colonel Percy Laurie, D.S.O., the Chief of the Metropolitan Police.

Too much praise cannot be given to Mr. Raymond Holmes and his helpers for their wonderful organisation on behalf of their Alma Mater, as the whole affair passed off without a single hitch.